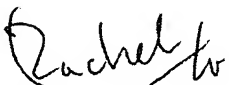




## CERTIFICATE OF VERIFICATION

I, Gil Jin Young of Patrea Co.,Ltd., 1105 Rm, Yeosam bldg. 648-23, Yeoksam-dong, Ganam-gu, Seoul, Republic of Korea state that the attached document is a true and complete translation to the best of my knowledge of the Korean-English language and that the writings contained in the following pages are correct English translation of the specification and claims of the Korean Patent Application No. 10-2002-0079375.

Dated this 8th day of July, 2008

Signature of translator: 

Name: Gil Jin Young

# **KOREAN INTELLECTUAL PROPERTY OFFICE**

This is to certify that the following application  
annexed hereto is a true copy from the records of the  
Korean Industrial Property Office.

Application Number: KR 10-2002-0079375

Date of Application: Dec. 12. 2002

Applicant(s): LG Electronics Inc.

**COMMISSIONER**

**[ABSTRACT OF DISCLOSURE]**

**[ABSRTACT]**

The present invention relates to the apparatus and the method for presenting text-based subtitle which is advantageous of synchronizing the text based subtitle related to A/V data of the high density optical disc such as BD-ROM, so that text-based subtitle without PCR information can be mixed with the video data of the high density optical disc, and data file text like 'xml' can be mixed with the high density optical video data.

**[REPRESENTATIVE DRAWING/ TYPICAL DRAWINGS]**

FIG. 4

**[INDEX WORDS]**

High density read only optical disc (BD-ROM), program clock reference, presentation time stamp, system timing clock, ref-clock control, off set, script

[SPECIFICATION]

[TITLE OF THE INVENTION]

METHOD AND APPARATUS FOR PRESENTING VIDEO DATA IN  
SYNCHRONIZATION WITH TEXT-BASED DATA

[BRIEF DESCRIPTION OF THE DRAWINGS]

FIG. 1 illustrates conventional optical disc  
apparatus;

FIG. 2 illustrates MPEG2 transport stream A/V data  
recorded on an optical disc and text-based data to be  
presented along with the A/V data;

FIG. 3 illustrates a trick play in the conventional  
optical disc apparatus;

FIG. 4 illustrates;

FIG. 5 illustrates an optical disc apparatus of the  
present invention which a method and an apparatus for  
presenting video data in synchronization with text-based  
data of another embodiment are applied to;

FIG. 6 is a concept diagram of a subtitle decoder  
which the method for presenting video data in  
synchronization with text-based data in accordance with the  
present invention is applicable to; and

FIG. 7 illustrates syntax written in the 'xml' file  
of the subtitle in accordance with the present invention.

**\*Description of main part in drawings\***

10, 20: Demux and decoder      11, 21: STC controller

12, 23: Video decoder                      13, 22: Audio decoder  
24: mixer                                      25: Ref-Clock control  
26: Subtitle syntax interpreter  
27: subtitle renderer                      30: Initial PTS offset  
40: subtitle decoder

**[DETAILED DESCRIPTION OF THE INVENTION]**

**[OBJECT OF THE INVENTION]**

**[FIELD OF THE INVENTION AND BACKGROUND OF THE RELATED ART]**

The present invention relates to a method and apparatus for presenting A/V data in the high density optical disc such as a Blu-ray Disc-ROM disc in synchronization with text-based subtitle.

Recently, the standardization of new high-density read only and rewritable optical discs capable of recording large amounts of high quality video and audio data has been progressing rapidly and new optical disc related products are expected to be commercially available on the market in the near future. The Blu-ray Disc Rewritable (BD-RE) and Blu-ray Disc ROM (BD-ROM) are examples of these new optical discs.

In the meantime, A/V data of MPEG 2 transport stream is written in the high density optical disc, the optical disc apparatus which reads and reproduces A/V data recorded in the high density optical disc comprises, as shown in FIG.

1, TS Demux and Decoder 10, STC (System Timing Clock) controller 11, video decoder 12, and audio decoder 13.

And, MPEG2 transport stream reproduced from high density optical disc is separately outputted Video Elementary stream and Audio elementary stream in the TS Demux and decoder 10, and as shown in FIG. 2, at desired time, for example, PCR (Program Clock Reference) information and packets recorded intermittently at a 0.7 sec. cycle are separately outputted.

In the video decoder 12, the presentation time stamp (PTS) included in the transport packets (TPs), which specify the system time at which corresponding PES packets are to be presented, are compared with the STC counts and the PES packets are decoded and presented based on the comparison result.

In the STC controller 11, system timing clock (STC) is generated according to the PCR information, and PTS information in the video decoder and the audio decoder is presented in synchronization. For example, as shown in FIG. 3, when Trick play is performed upon a user's request, the video decoder and the audio decoder are controlled in order to present video and audio in synchronization.

In the meantime, text-based subtitle may be recorded as a special data file separated from A/V data, and downloaded in the apparatus through network such as the

Internet. The text-based data generally does not provide PCR information and only includes presentation time setup stamp information for each data unit as shown in FIG. 2.

Accordingly, a method for reproducing the text-based subtitle without PCR information synchronized with the A/V data in the high density optical disc is needed. Particularly, when a trick play is performed upon a user's request, randomly accessed A/V data, for instance, as shown in FIG. 3, the A/V data and the text-based subtitle are synchronized so that the video data and text data of the subtitle are mixed to be outputted in an Initial reproducing start point (A), reproducing start point (B) after jump, and reproducing start point (C) after back jump.

**[TECHNICAL SOLUTION OF THE INVENTION]**

Accordingly, the present invention is devised by taking the circumstances above into consideration. The present invention is to provide the method and the apparatus for presenting video data in synchronization with text-based data in which A/V data and text-based subtitle recorded in the high density optical disc such as read only BD-ROM or text-based subtitle downloaded through network according to PCR information included in the transport packet (TP) reproduced from the high density optical disc and video data and text data are mixed to be represented in order.

**[SYSTEM AND OPERATION OF THE INVENTION]**

The method for presenting video data in synchronization with text-based data in accordance with the present invention to achieve the objects will be explained as follows.

The method is characterized that audio and video data and text-based subtitle reproduced from the high density optical disc or text-based subtitle stored in the apparatus are synchronized according to the presentation time stamps (PTS), and presentation time stamps of the subtitle is controlled by the System timing clock (STC), and the video data and text image of the subtitle are presented in synchronization.

In addition, the apparatus for presenting text-based subtitle comprises a first means for generating video presentation reference time synchronized with program clock reference included in a video data stream reproduced from a recording medium, a second means for controlling text-based subtitle reproduced from the high density optical disc or presentation time stamps controlled by the system timing clock, and a third means for representing the video data and text image of subtitle to be synchronized by the presentation time stamps controlled by the system timing clock.



Hereinafter, preferred embodiment of the method and apparatus for presenting video data in synchronization with text-based data in accordance with the present invention will be explained in detail with accompanying drawings.

First of all, in an optical disc, which the first embodiment of the apparatus and the method for presenting video data in synchronization with text-based data in accordance with the present invention is applicable to, comprises TS Demux and decoder 20, STC controller 21, audio decoder 22, video decoder 23, mixer 24, Ref-clock control 25, subtitle syntax interpreter 26, and subtitle renderer 27 as a hardware or software.

In the meantime, as described in FIG. 1, MPEG2 transport stream reproduced from the high density optical disc is demuxed and decoded by the TS Demux and decoder 20, separately outputted as Video elementary stream, audio elementary stream, PCR information and packets, and the Video elementary stream and audio elementary stream are decoded in the video decoder 22 and the audio decoder 23 respectively according to the PRS information included in the PES packet.

And, in the STC controller 21, system timing clock STC is generated according to the PCR information to control PTS information to be synchronized in the video decoder and the audio decoder. AT this point, the system

timing clock is outputted as a Ref-clock control 25 in order to synchronize the text-based subtitle in which PCR information is not recorded with the video and audio data.

For instance, as shown in FIG. 3, in order to synchronize the A/V data with the text-based subtitle, the system timing clock is outputted as Ref-clock control 25 or the system timing clock is requested and received in the ref-clock control 25 in the first reproducing point (A), Reproducing start point (B) after jump, and reproducing start point (C) after back jump.

Data file separated from A/V data recorded in the high density optical disc, for instance, PTS (Start\_PTS\_Subtitle) which is the same time value as the A/V data PTS (Start\_PTS\_A/V) is recorded in the text-based subtitle recorded and separated as a text file, or text-based subtitle downloaded in the apparatus through the network such as the Internet.

Syntax which recorded in the text-based subtitle is interpreted and PTS information of Text unit, text position information to be reproduced and displayed, color information, Bit depth information are putted as the subtitle renderer 27 in the Subtitle Syntax Interpreter 26.

In the mean time, the subtitle renderer 27 outputs subtitle image of the text as a bit map according to the above information, the text subtitle image is output

according to the above PTS information, and the mixer 24 mixes the text subtitle image and the decoded video and displays the video with the subtitle through the screen like TV.

Ref-clock control 25 generates ref-clock of the text-based subtitle and controls PTS information of the subtitle renderer 27 and PTS information in the video and audio decoders to be synchronized.

Accordingly, in case of starting to reproduce upon the user's request or performing trick play, for instance, as shown in FIG. 3, the A/V data and text-based subtitle are synchronized to mix the video data and the text data to be outputted in the first reproducing start point (A), reproducing point (B) after jump, and reproducing start point (C) after back jump.

In the mean time, in a second embodiment, the Initial\_PTS\_Subtitle separated from PTS of the A/V data may be recorded in the text-based subtitle. For instance, the Initial\_PTS\_Subtitle may be included in the Text File start part area or recorded and managed in the separated file.

And, as shown in FIG, 5, the Initial PTS offset detector 30 may be further included as a hardware or software, and offsets between the Initial PTS of the A/V data and the Initial PTS of the subtitle are compared and detected.

For instance, the Initial offset detector 30 compares Initial\_PTS\_A/V managed by a navigator (not shown) for reproducing and controlling the A/V data and the Initial\_PTS\_Subtitle and detects the offset value. When the Initial\_PTS\_A/V is '100' and the Initial\_PTS\_Subtitle is '300', the offset value is '200' so outputted as Ref-clock control 25.

In addition, in the Ref-clock control 25 generates ref-clock to the text-based subtitle, and according to STC reproduced from the STC controller 21 and the offset value '200', controls to synchronize PTS information of the subtitle renderer 27 with the PTS information in the video decoder and the audio decoder.

Accordingly, in case of starting the reproducing upon the user's request or performing the trick play, for instance, as shown in FIG. 3, in the Initial start reproducing point (A), start reproducing point (B) after jump, and start reproducing point (C) after back jump, using ref-clock generated and outputted according to STC and offset value PTS information to the subtitle is controlled, so A/V data and text-based subtitle is synchronized that the video data and text data is mixed to be outputted.

In addition, text files of various subtitles which have an Initial PTS separated from Initial PTS of the A/V

data may be synchronized with the A/V data reproduced from the high density optical disc to represent.

For accuracy for synchronizing the A/V data reproduced from the high density optical disc with the text-based subtitle, ref-clock for reproducing the subtitle and the resolution of PTS may set as a resolution applicable to the PCR information, for instance, a resolution of 90 KHz, which is obtained by dividing 27 MHz by 300, and the.

In addition, ref-clock for reproducing the subtitle and the resolution of PTS may have a random resolution different from the resolution applicable to PCR information of the A/V data, in this case, as shown in FIG. 6, text-based subtitle may be decoded by the decoder 40 comprising a software so that '1/1000 sec.', a resolution of '1ms' which is applicable to the conventional MICOM (not shown) may be set, or special value may be used such as Frame rate.

In the above, subtitle data was mentioned as text data having no PCR information. As shown in FIG. 7, the subtitle data is recorded as a text file of the 'xml' format. The xml format subtitle data includes a plurality of <SUBTITLE> syntax and a <SUBTITLE> section may include PTS information (LYLIC sync="100") such as 'Let the word go forth', color information (color="0x20"), presentation duration information (duration="1000"), etc.

And the subtitle data may include java scripts, for instance, script type='text/javascript', for providing the text with various display effects such as fade-in/out.

While the invention has been disclosed with respect to preferred embodiments, those skilled in the art, having the benefit of this disclosure, will appreciate numerous modifications and variations therefrom. It is intended that all such modifications and variations fall within the spirit and scope of the invention.

**[EFFECT OF THE INVENTION]**

The apparatus and the method for presenting text-based subtitle in accordance with the present invention is advantageous of synchronizing the text based subtitle related to A/V data of the high density optical disc such as BD-ROM, so that text based subtitle without PCR information can be mixed with the video data of the high density optical disc, and data file text like 'xml' can be mixed to be reproduced with the high density optical video data.

**What is claimed is:**

1. A method for presenting text-based subtitle is characterized that audio and video data and text-based subtitle reproduced from the high density optical disc or text-based subtitle stored in the apparatus are synchronized according to the presentation time stamps (PTS), and presentation time stamps of the subtitle is controlled by the System timing clock (STC), and the video data and text image of the subtitle are presented in synchronization.

2. The method for presenting text-based subtitle as claimed in claim 1, wherein the video data and the text image of the subtitle is mixed and outputted as one image frame.

3. The method for presenting text-based subtitle as claimed in claim 1, wherein the program clock reference (PCR) is not recorded in the text-based subtitle.

4. The method for presenting text-based subtitle as claimed in claim 1, wherein the step of controlling the presentation timing stamps (PTS) of the subtitle is performed one of initial reproducing point upon the user's

request, starting reproducing point after jump, and starting reproducing after back jump.

5. The method for presenting text-based subtitle as claimed in claim 1, wherein the start presentation time stamps (PTS) as same as the start time stamps of the audio and video in the text-based subtitle.

6. The method for presenting text-based subtitle as claimed in claim 1, wherein the initial time stamps are recorded separate from PTS of the audio and video in the text-based subtitle.

7. The method for presenting text-based subtitle as claimed in claim 6, wherein the STC is generated based on the offset value and the PCR of the audio and video data after detecting offset value between Initial PTS recorded in the text-based subtitle and the PTS of the video and the audio, and PTS of the subtitle is controlled by the STC, and the video data and text image of the subtitle are synchronized to reproduced.

8. The method for presenting text-based subtitle as claimed in claim 1, wherein the Ref-clock control for controlling the presentation time stamp of the subtitle and



the presentation time stamp included in the subtitle and recorded have the same resolution as PCR of the audio and the video data.

9. The method for presenting text-based subtitle as claimed in claim 1, wherein the Ref-clock control for controlling the presentation time stamp of the subtitle and the presentation time stamp included in the subtitle and recorded have a random resolution independent from that of the audio and the video data.

10. The method for presenting text-based subtitle as claimed in claim 9, wherein the resolution of the ref-clock and the presentation time stamps is set the resolution at 1/1000 sec.

11. The method for presenting text-based subtitle as claimed in claim 1, wherein the at least one '<SUBTITLE>' syntax is included and recorded in the text file corresponding to the text-based subtitle, and at least one of ref-clock information for reproducing the text, color information, duration information is included and recorded.

12. The method for presenting text-based subtitle as claimed in claim 11, wherein the information for

reproducing and controlling the text as a variety of display effects in the text file corresponding to the text-based subtitle is included and recorded as a java script.

13. An apparatus for presenting text-based subtitle comprises:

a first means for generating video presentation reference time synchronized with program clock reference included in a video data stream reproduced from a recording medium,

a second means for controlling text-based subtitle reproduced from the high density optical disc or presentation time stamps controlled by the system timing clock, and

a third means for representing the video data and text image of subtitle to be synchronized by the presentation time stamps controlled by the system timing clock.

14. The method for presenting text-based subtitle as claimed in claim 13, wherein the fourth means for outputting as the second means, after detecting the initial PTS recorded in the text-based subtitle and offsets between PTS of the audio and that of the video.

15. The method for presenting text-based subtitle as claimed in claim 14, wherein the second means controls PTS of the text-based subtitle referring to STC and offset value.